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APPLICATION

FOR

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TITLE: DISPLAYING VIDEO IN APPLICATION

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DISPLAYING VIDEO IN APPLICATION

Background

This invention relates generally to displaying video in an application executable on a processor-based system.

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Improvements in video technology have made it possible to employ video in a variety of applications, including in software applications executing on processor-based systems, such as personal computers. For example, a television software application may be used to display television (TV) signals received through a TV tuner card, which may be installed in a processor-based system, for instance. Alternatively, a video application may display video received over a network, such as the Internet. As utilized herein, the term "video application" refers to any application capable of displaying video on a display device.

With the versatility of today's processor-based systems, a user may view video as well as perform a variety of other tasks on the processor-based system, such as word processing, browsing the Internet, electronic mail processing, and the like. In some instances, however, it may be difficult for the user to perform the task at hand

while also being able to view the video, as the video window may be hidden in the back ground, behind windows of other applications, such as a word processor, electronic mail application, web browser, and the like. In order to
5 be able to view the video while performing other tasks, the user may have to painstakingly arrange the applications on the display such that all the desired windows are viewable. Arranging the windows in a desired manner, however, may not only be time consuming but may also require the user to
10 reduce the size of the windows to enable the windows to fit the viewable region on the display device.

Thus, there is a need to display video on a processor-based system that may be conveniently viewed.

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Brief Description of the Drawings

The invention may be understood by reference to the following description taken in conjunction with the accompanying drawings, in which like reference numerals
20 identify like elements, and in which:

Figure 1 is a stylized block diagram of a communications system, in accordance with one embodiment of the present invention;

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Figure 2 is a block diagram of a processor-based system that may be employed in the communications system of Figure 1, in accordance with one embodiment of the present invention;

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Figure 3 is a flow chart of one embodiment of software resident on the processor-based system of Figure 2;

Figure 4 is an example of a text object shown in a window of the software of Figure 3, in accordance with one embodiment of the present invention;

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Figure 5 is an example of an arrangement of a text and video object shown in the window of the software of Figure 3, in accordance with one embodiment of the present invention;

Figures 6A-6B illustrate a flow chart of an alternative embodiment of software resident on the processor-based system of Figure 2;

Figure 7 is an example arrangement of the text object shown in the window of the software of Figure 2 in response to the video object being moved within the window, in accordance with one embodiment of the present invention; and

Figure 8 is an example arrangement of the text object shown in the window of the software of Figure 2 in response to re-sizing the video object, in accordance with one embodiment of the present invention.

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Detailed Description

Referring now to Figure 1, a block diagram of a communications system 10 in accordance with one embodiment of the present invention is illustrated. The communications system 10, in one embodiment, includes a network 15 that may be coupled to a plurality of processor-based systems 35(1-n). In an alternative embodiment, one or more of the processor-based systems 35(1-n) may be standalone devices, and may not be coupled to the network 15. The data network 15 may be a public network, such as the Internet.

In one embodiment, the processor-based system 35(1-n) may be a laptop computer, desktop computer, main frame computer, television with a setup box, an Internet appliance, or any other device that is capable of receiving video signals.

In one embodiment, the communications system 10 includes a transmitter 37 for broadcasting television

signals, which may then be received by one or more of the processor-based systems 35(1-n).

The processor-based system 35(1), in one embodiment, includes a television tuner interface 40 for receiving television broadcast signals over a wireless link 42. In one embodiment, the processor-based system 35(1) may include a network interface 45 for interfacing with the network 15. The network interface 45 may, in one embodiment, receive information comprising text, images, and/or video signals over the network 15.

Referring now to Figure 2, one embodiment of the processor-based system 35(1) is illustrated. The processor-based system 35(1) comprises a control unit 205, which in one embodiment may be a processor. The control unit 205 in one embodiment may be capable of interfacing with a north bridge 210. The north bridge 210 may provide memory management functions for memory 215, as well as serve as a bridge to a peripheral component interconnect (PCI) bus 220. The processor-based system 35(1) includes a south bridge 230 coupled to the PCI bus 220, in one embodiment. The south bridge 230, in one embodiment, includes a Universal Serial Bus (USB) host controller 235 that may be coupled to an imaging device 240 by a universal serial bus 242 through an USB interface 245.

In one embodiment, the imaging device 240 may be a video camera capable of capturing and providing video signals to the USB interface 245. Although the imaging device 240 is illustrated as being coupled to the processor-based system 35(1) via the USB interface 245, in alternative embodiments, the imaging device 245 may be coupled to the processor-based system 35(1) through other means, such as a serial (RS232) port, parallel port, video input capture port, and the like.

In one embodiment, the processor-based system 35(1) includes the television tuner interface 40 that may be coupled to the PCI bus 220. In one embodiment, the television tuner interface 40 may include a television tuner card. The processor-based system 35(1), in one embodiment, includes the network interface 45 that may be coupled to the PCI bus 220. The network interface 45, in one embodiment, may include a network card. The television tuner interface 40 and the network interface 45 may be adapted to receive video signals over the link 42 and the network 15, respectively.

The processor-based system 35(1) may include a graphics controller 247 that may be coupled to a display interface 250 and a television interface 257, in one embodiment. In one embodiment, the graphics controller 247

is capable of processing graphics for the processor-based system 35(1). The output interface 250 may interface with a display device 255 on which images captured by the imaging device 240 may be displayed. The television interface 257 may interface with a television 258, in one embodiment. The display device 255 and the television 258 may be capable of displaying text and/or video. Video received by the television tuner interface 40 and/or the network interface 45 may be displayed on at least one of the display device 255 and television 258.

In one embodiment, the processor-based system 35(1) may include an input interface 260 that is coupled to the south bridge 230. The input interface 260 may be capable of interfacing with one or more input devices, such as a mouse 262 or a keyboard 265.

The processor-based system 35(1) includes a storage unit 270 that is coupled to the south bridge 230, in one embodiment. The storage unit 270 may have an application 50 that is capable of displaying video in a window having text and/or one or images, as is described in more detail below. The application 50 may be any one of a variety of applications, such as a word processor, spread sheet, web browser, electronic mail processing application, or any application being capable of executing on the processor-

based system 35(1). In one embodiment, the application 50, when executed on the processor-based system 35(1), opens a window in which text, images/graphics, video, and the like may be displayed. In one embodiment, the application 50
5 may operate at a ring 3 level. The storage unit 270 may include in one embodiment an operating system, such as the WINDOWS® operating system provided by Microsoft Corporation.

In one embodiment, the processor-based system 35(1)
10 includes a drive interface 272 that interfaces with a disk drive 274. The disk drive 274 may be a compact disc read only memory (CDROM) drive, a digital video disk (DVD) drive, a diskette drive, and the like. In one embodiment, video played on the disk drive 274 may be displayed on the
15 display device 255 or the television 258.

For clarity and ease of illustration, only selected functional blocks of the processor-based system 35(1) are illustrated in Figure 2, although those skilled in the art
20 will appreciate that the processor-based system 35(1) may comprise additional functional blocks. Additionally, it should be appreciated that Figure 2 illustrates one possible configuration of the processor-based system 35(1) and that other configurations comprising different
25 interconnections may also be possible without deviating from the spirit and scope of one or more embodiments of the

present invention. For example, in an alternative embodiment, the display controller 257 may be coupled to the north bridge 210 directly (as opposed to the PCI 220). As an additional example, the USB controller 235 may be implemented outside the south bridge 230, in one embodiment. Similarly, other elements of the processor-based system 35(1) may be configured differently.

Referring now to Figures 3-5, a flow diagram of the application 50 (see Figure 2) is illustrated, in accordance with one embodiment of the present invention. Although not so limited, in the illustrated embodiment the application is a web browser application. The application 50 of the processor-based system 35(1) receives (at 310) a first object 415 (see Figure 4 -- described below) for displaying in the application's window on the display device 255 (see Figure 2). The first object 415 may include text, images/graphics, video, or a combination thereof. In one embodiment, the first object 415 may comprise a portion of information that is received over the network 15, from a website, for example. Alternatively, if the application 50 is a word processor, for example, then the first object 415 may be a portion of the text of a file being edited. The application 50 displays (at 320) the first object 415 in its window 410, as shown in Figure 4, for example.

Figure 4 illustrates the application (e.g., browser) window 410 in which a sample text "THIS TEXT IS IN A BROWSER WINDOW" is repeated. This repeated text may be one example of the first object 415 that is displayed (at 320 -
5 - see Figure 3). It should be understood that the term "object" does not necessarily refer to any specific text or image, but, instead, may refer to text/image (or a portion thereof) that is being displayed in the application window 410 at any given time, in one embodiment.

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Referring again to Figure 3, the application 50 receives (at 330) a second object 515 (see Figure 5 -- described below) for displaying in the application window 410 (see Figure 4), wherein the second object 515 includes
15 video. The video may be received from one of a variety of sources, including from the imaging device 240, the network interface 45, the television tuner interface 40, and/or the disk drive 274 of Figure 2. In other embodiments, the video may be received from other suitable means.

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The application 50 displays (at 340) the second object 515 in the application window 410 and adjusts (at 350) the position of the first object 415 in response to displaying
(at 340) the second object 515 in the application window
25 410, as shown in Figure 5. Figure 5 illustrates that the second object 515 (e.g., video) is displayed in a right-

hand corner of the application window 410, and the first object 415, (e.g., text) is adjusted so that both the first and second objects 415, 515 are viewable, in one embodiment. It should be understood that the contents of the second object 515 might change with time, as new video is received for displaying in the application window 410. As such, the term "the second object" 515 may refer to information being displayed in the application window 410 during a given time.

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Referring now to Figures 6A-6B, 7, and 8, Figures 6A-6B illustrate a flow diagram of an alternative embodiment of the application 50. The application 50 displays (at 610) a first object 710 (see Figure 7) in the application window 410 (see Figure 4), wherein the first object 710 includes video, in one embodiment. The application 50 receives (at 615) a second object 715 (see Figure 7), wherein the second object 715 includes at least one of text and image. The application 50 displays (at 620) the second object 715 (e.g., text, image) based on the location of the first object 710 (e.g., video), wherein both the first and second objects 710, 715 may be viewed substantially concurrently in the application window 410. In one embodiment, the application 50 positions the second object 715 in a manner so as to not overwrite the window space occupied by the first object 710.

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The application 50 determines (at 625) whether a user wishes to adjust the first object 710, wherein the adjusting may include, but is not limited to, moving the first object 710, re-sizing the first object 710, or even removing the first object 710 from the application window 410. In accordance with one embodiment of the present invention, the user may manipulate that first object 710 in any manner a window may be manipulated in the WINDOWS® operating system.

If the user does not wish to adjust the first object 710 (e.g., video), then the application 50 continues (at 630) displaying the first and second objects 710, 715 in the application window 410. If the user wishes to adjust the first object 710, then the application 50 determines (at 635) if the user wishes to move the first object 710. If yes, then the application allows (at 640) the user to move the first object 710 to a desired location. The first object 710 may be moved, in one embodiment, by selecting the first object 710 using the mouse 262 (see Figure 2) and then dragging the first object 710 to the desired location within the application window 410. In one embodiment, the application adjusts (at 645) the second object 715 (e.g., text, images) in response to the first object 710 being moved, as shown in Figure 7 (discussed below). After

adjusting (at 645) the second object 715, the application 50 continues (at 630) with its operation, in one embodiment.

5 Figure 7 illustrates an example arrangement of the first object 710 being moved to a different location. As can be seen, when the first object 710 is moved towards the middle of the application window 410, the second object 715 is rearranged so that it is not obscured by the first
10 object 710. In the illustrated embodiment, the text 715 is adjusted in a manner so that both the text 715 and video 710 are viewable in the application window 410. In an alternative embodiment, the first object 710 may comprise text and/or images but no video.

15 Referring again to Figure 6B, upon determining that the user does not wish to move the first object 710, the application 50 determines (at 650) if the user wishes to re-size the first object 710. If yes, the application 50
20 allows the user to re-size the first object 710 to a desired size. The first object 710 may be re-sized, for example, by selecting one of the sides of the first object 710 using the mouse 262 (see Figure 2) and dragging the selected side until the first object 710 is enlarged or
25 reduced to the desired size. Based on re-sizing of the first object 710, the application 50 adjusts (at 660) the

second object 715, as shown in Figure 8 (discussed below). After adjusting (at 660) the second object 715, the application 50 continues (at 630) with its operation, in one embodiment.

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Figure 8 illustrates an example arrangement of the first object 710 being re-sized to a user-selected size. As can be seen, when the first object 710 is enlarged, the application 50 rearranges the second object 715 so that the
10 second object 715 is not obscured by the first object 710. In the illustrated embodiment, because of the large size of the re-sized first object 710, the entire second object 715 (e.g., text) is not displayable in the application window 410. As such, the application 50, in one embodiment, moves
15 the undisplayed portion of the second object 715 to a next page of the application window 410. The undisplayed portion of the second object 715 may be viewed by scrolling down the application window 410 using the scroll bar 810, in one embodiment. As the text is scrolled, the
20 application 50, in one embodiment, arranges the text "around" the video object. Thus, in accordance with one embodiment of the present invention, the application 50 enables a user to view both the first and second objects 710, 715 in the application window 410.

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Referring again to Figure 6B, the application 50 allows (at 665) a user to remove the first object 710 from the application window 410. In response to removing the first object 710, the application 50, in one embodiment, 5 adjusts (at 670) the position of the second object 715 so that the space that was otherwise consumed by the first object 710 is now used for displaying the second object 715 (e.g., the text). The application 50, in one embodiment, continues (at 630) with further processing after adjusting 10 (at 670) the second object 715.

In one embodiment, the application 50 allows a user to scroll through the application window 410 in which the video object is also being displayed. As the user scrolls 15 through the application window 410, the application 50 displays, in one embodiment, text in a manner that does not interfere with the portion of the application window 410 showing the video. The new text displayed during scrolling may be considered as receiving a new second object 715 20 (i.e., see block 615 of Figure 6A), in one embodiment. The scrolling may occur on a line by line basis, or, alternatively on a page by page basis, in one embodiment.

For illustrative purposes, the application window 410 25 has been shown on the display device 255; however, in other embodiments, the application window may also be displayed

on the television 258 alone or on both the display device 255 and the television 258.

The various system layers, routines, or modules may be
5 executable control units (such as the control unit 205 (see
Figures 2)). Each control unit may include a
microprocessor, a microcontroller, a processor card
(including one or more microprocessors or controllers), or
other control or computing devices. The storage devices
10 referred to in this discussion may include one or more
machine-readable storage media for storing data and
instructions. The storage media may include different
forms of memory including semiconductor memory devices such
as dynamic or static random access memories (DRAMs or
15 SRAMs), erasable and programmable read-only memories
(EPROMs), electrically erasable and programmable read-only
memories (EEPROMs) and flash memories; magnetic disks such
as fixed, floppy, removable disks; other magnetic media
including tape; and optical media such as compact disks
20 (CDs) or digital video disks (DVDs). Instructions that
make up the various software layers, routines, or modules
in the various systems may be stored in respective storage
devices. The instructions when executed by a respective
control unit cause the corresponding system to perform
25 programmed acts.

The particular embodiments disclosed above are illustrative only, as the invention may be modified and practiced in different but equivalent manners apparent to those skilled in the art having the benefit of the teachings herein. Furthermore, no limitations are intended to the details of construction or design herein shown, other than as described in the claims below. It is therefore evident that the particular embodiments disclosed above may be altered or modified and all such variations are considered within the scope and spirit of the invention. Accordingly, the protection sought herein is as set forth in the claims below.